We Claim:

1. A carbon nanotube mesh comprising:

a plurality of intertwined free-standing carbon nanotubes fixedly attached to a substrate for separating, concentrating, and/or filtering molecules flowed through said mesh.

2. The carbon nanotube mesh of claim 1,

wherein said carbon nanotubes extend randomly into free space from said substrate characteristic of free-growth structures.

3. The carbon nanotube mesh of claim 1,

wherein the surfaces of said carbon nanotubes are functionalized to chemically select/discriminate molecules.

4. The carbon nanotube mesh of claim 3,

wherein the surfaces of said carbon nanotubes are functionalized with a nanotube coating.

5. The carbon nanotube mesh of claim 4,

wherein the nanotube coating comprises a chemical derivatization.

6. The carbon nanotube mesh of claim 1,

wherein said carbon nanotube mesh has pore sizes of 10 to 200 nanometers.

7. A method of fabricating a carbon nanotube mesh, comprising:

growing a plurality of intertwined free-standing carbon nanotubes on a substrate to produce the carbon nanotube mesh fixedly attached thereto and capable of separating, concentrating, and/or filtering molecules flowed through said carbon nanotube mesh.

8. The method of claim 7,

wherein said carbon nanotubes are free-grown to extend randomly from the surface of said substrate into free space.

9. The method of claim 5,

further comprising functionalizing the surfaces of said carbon nanotubes to chemically select/discriminate molecules.

10. The method of claim 9,

wherein the surfaces of said carbon nanotubes are functionalized by applying a nanotube coating having the desired functionality.

11. The method of claim 10,

wherein the nanotube coating comprises a chemical derivatization.

12. The method of claim 7,

wherein said carbon nanotube mesh has pore sizes of 10 to 200 nanometers.

13. The method of claim 7,

further comprising depositing a CVD growth catalyst on said substrate and utilizing a CVD growth process to grow said carbon nanotube mesh.

14. The method of claim 13,

wherein the CVD growth process includes pyrolysis of a mixture of ethylene, hydrogen, and argon at 850 degrees Celsius.

15. The method of claim 14,

wherein the CVD growth catalyst is iron.

16. The method of claim 15,

wherein the iron catalyst is deposited as a thin film.

17. The method of claim 16,

wherein the thin film iron catalyst has a thickness of about 5 nanometers.

18. A carbon nanotube mesh produced according to the method of claim 7.

19. A method of separating, concentrating, and/or filtering molecules comprising:

flowing said molecules into a carbon nanotube mesh comprising a plurality of intertwined free-standing carbon nanotubes fixedly attached to a substrate, whereby said carbon nanotube mesh operates as an active medium for separating, concentrating, and/or filtering said molecules.

20. The method of claim 19,

wherein the flow into the carbon nanotube mesh is a pressure driven flow.